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IS 10632-2 (1983): Non Magnetic stainless steels for electrical applications, Part 2: Specific requirements for binding wire [MTD 16: Alloy Steels and Forgings]



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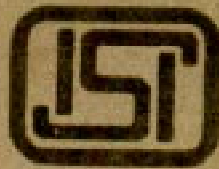


Indian Standard

SPECIFICATION FOR
NON-MAGNETIC STAINLESS STEELS FOR
ELECTRICAL APPLICATIONS

PART 2 SPECIFIC REQUIREMENTS FOR BINDING WIRES

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Indian Standard

SPECIFICATION FOR NON-MAGNETIC STAINLESS STEELS FOR ELECTRICAL APPLICATIONS

PART 2 SPECIFIC REQUIREMENTS FOR BINDING WIRES

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IS : 10632 (Part 2) - 1983

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Indian Standard

SPECIFICATION FOR NON-MAGNETIC STAINLESS STEELS FOR ELECTRICAL APPLICATIONS

PART 2 SPECIFIC REQUIREMENTS FOR BINDING WIRES

0. FOREWORD

0.1 This Indian Standard (Part 2) was adopted by the Indian Standards Institution on 30 August 1983, after the draft finalized by the Alloy Steels and Special Steels Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard has been prepared with a view to guiding the industry with regard to manufacture and use of non-magnetic stainless steel wires, sheets strips and plates for electrical applications.

0.3 For the benefit of the purchaser, an informative appendix (*see* Appendix A) giving particulars to be specified while ordering for the steel has been included.

0.4 This standard is being published in three parts, as given below:

Part 1 General requirements

Part 2 Specific requirements for binding wires

Part 3 Specific requirements for sheets, strips and plates for electrical applications.

0.5 This standard keeps in view the manufacturing and trade practices followed in the country in this field. In the formulation of this standard assistance has been derived from JIS —C 2507-1977 'Tin coated non-magnetic steel wire for armature binding' issued by Japanese Industrial Standards Committee.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 2) lays down the requirements for chemical composition, mechanical, electrical and magnetic properties for non-magnetic stainless steel tinned round wires and flattened wires for binding of armatures and rotors.

2. GENERAL REQUIREMENTS

2.1 The general requirements for manufacture, tests, sampling, freedom from defects, packing and marking shall conform to those given in IS : 10632 (Part 1)-1983*.

3. CHEMICAL COMPOSITION

3.1 The ladle analysis of steel, when analysed either by the method specified in the relevant parts of IS : 228† or any other established instrumental/chemical method, shall conform to the requirements specified below:

<i>Constituents</i>	<i>Percent</i>
Carbon	0.08-0.13
Silicon	0.4-0.8
Manganese	0.8-1.2
Sulphur, <i>Max</i>	0.03
Phosphorus, <i>Max</i>	0.03
Nickel	13.0-14.0
Chromium	13.0-14.0
Cobalt, <i>Max</i>	0.3
Molybdenum, <i>Max</i>	0.3
Copper, <i>Max</i>	0.2
Iron	Remainder

3.1.1 In case of dispute the procedure given in the latest edition of relevant part of IS : 228† for chemical analysis, shall be the 'referee method.'

3.2 Product Analysis — The permissible variation in case of product analysis from other limits specified in 3.1 shall be as given in Table 1.

*Specification for non-magnetic stainless steels for electrical applications: Part 1 General requirements.

†Methods for chemical analysis of steel (*second revision*). (Issued in parts).

TABLE 1 PERMISSIBLE VARIATION BETWEEN SPECIFIED ANALYSIS AND PRODUCT ANALYSIS
(*Clauses 3.2*)

CONSTITUENT	LIMIT OF LADLE ANALYSIS SPECIFIED PERCENT		PERMISSIBLE DEVIATION PERCENT
	Over	Up to and Including	
C	— 0.030	0.030 0.13	+ 0.005 ± 0.01
Si	—	0.8	+ 0.05
Mn	— 1.0	1.0 2.0	+ 0.03 ± 0.04
Cr	10.0 15.0	15.0 19.0	± 0.15 ± 0.20
Mo	—	0.3	+ 0.03
Ni	10.0	14.0	± 0.15
Co	—	0.3	+ 0.07
Cu	—	0.25	+ 0.05
S	—	0.030	+ 0.005
P	—	0.03	+ 0.005

NOTE — Variations shall not be applicable both over and under the specified limits in several determination in a heat.

4. DIMENSIONS AND TOLERANCES

4.1 The preferred nominal sizes of the round wires and flattened wires shall be as given below:

- a) Wires (d in mm) — 0.5, 0.6, 0.8, 1.0, 1.2, 1.6
1.8, 2.0, 2.2, 2.4, 2.5, 2.8
- b) Flattened wire — 1.2×2.4 ; 1.2×3.0 , 1.5×3.0
($a \times b$ mm) 2.0×3.0 ; 2.2×3.0 , 1.5×4.0

NOTE 1 — 'a' denotes the thickness and 'b' the width of cross section of the flattened wire.

NOTE 2 — product forms and sizes other than those specified above may be made subject to mutual agreement between the purchaser and the manufacturer.

4.2 The tolerances on diameter (for round wires) and section size (for flattened wires) shall be as given below:

Size mm	Tolerance mm	Out of Round mm
Up to and including 1.5	± 0.03	0.03 Max
1.5 and above	± 0.05	0.05 Max

5. SURFACE FINISH

5.1 The surface of wires before and after tin coating shall be smooth, free from undulation, flaw or crack.

6. HEAT TREATMENT

6.1 Wires shall be supplied in hard-drawn and tinned condition and shall be used nonheat-treated.

7. TESTS

7.1 Tensile Test — The tensile strength of the round wires, and flattened wires, when tested in accordance with IS : 1521-1972*, shall be as given in Table 2.

TABLE 2 TENSILE STRENGTH REQUIREMENTS

TYPE OF WIRE	UTS, <i>Min</i> N/mm ² (kg/mm ²)	CONDITION
Round Wire	1 470 (150)	Cold-drawn
Flattened Wire	1 275 (130)	Cold-drawn and flattened by cold- rolling

NOTE — The length of the test piece between the jaws shall be 200 mm.

7.2 Reverse Bend Test — Reverse bend test shall be carried out in accordance with IS : 1716-1971†. When wire section is rectangular, bending shall be done on thickness. Radii of formers to be used for different wire sizes and number of turns of 180° alternate bending before failure shall be as given in the Table 3.

TABLE 3 REVERSE BEND TEST

DIAMETER, <i>d</i> or SECTION THICKNESS <i>a</i> mm	RADIUS OF FORMER, <i>R</i> mm	MINIMUM NO. OF TURNS OF 180° ALTERNATE BENDING BEFORE FAILURE, <i>n</i>
Up to 0.5	3	10
Over 0.5 and up to 1	3	6
Over 1.0 and up to 1.5	5	6
Over 1.5 and up to 2.0	10	8
Over 2.0	10	6

*Method for tensile testing of steel wire (*first revision*).

†Method for reverse bend testing of steel wire (*first revision*).

7.3 Wrapping Test — After tightly wrapping for complete turns around an arbour of 3 times the diameter, the wire shall not show cracking or splitting.

7.4 Electrical Resistivity — Electrical resistivity shall be measured in hard-drawn or cold-worked condition, and when tested in accordance with IS : 3636-1966* shall have minimum values as given in Table 4.

TABLL 4 ELECTRICAL RESISTIVITY

DIAMETER 'd' mm	RESISTIVITY, <i>Min</i>
Up to 1.0	65
Over 1.0 and up to 2.5	67
Over 2.5	69

7.5 Magnetic Property (Amagnetism) — Non-magnetic characteristics of the steel shall be evaluated in hard state. The dimensions of test pieces shall comply with the type of permeameter or any suitable apparatus mutually agreed to by the purchaser and the manufacturer. The value of induction shall not be more than 0.06 tesla (600 Gauss) for a magnetic field $H = 400$ ampere turn/cm (500 Oersted).

7.6 Coating Test — The tin coating test for wires shall be subject to agreement between the purchaser and the manufacturer.

8. SAMPLING

8.1 The requirements for sampling and the criteria for conformity shall conform to those given in **9.1** of IS : 10632 (Part 1)-1983† of this standard.

*Methods of test for resistance of metallic electrical resistance material.

†Specification for non-magnetic stainless steels for electrical applications: Part 1 General requirements.

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